AN OUTBREAK OF SUSPECTED CHIKUNGUNYA FEVER IN NORTHERN

Northern Rhodesia

In 1957, Dr. James Gear, of the Poliomyelitis Research Foundation in Johannesburg, and Dr. F. P. Reid published an account[1] of an outbreak of dengue-like fever in a number of persons who had visisted the Kruger National Park in the Northern Transvaal. Their patients suffered from a febrile condition of sudden onset with headache, photophobia, pain in the joints and muscles, sore throat, occasional cough, and a maculo-erythematous rash appearing between the second and sixth days. Prolonged convalescence and recrudescence of pain were a feature of the disease. They regarded the disease as probably identical with Chikungunya fever, an outbreak of which had been described in Tanganyika in 1952 - 53.

In May 1959 an outbreak of a condition closely resembling that described by Gear and Reid occurred in Luanshya, Northern Rhodesia. It differed, however, in one important respect — all the Rhodesian cases had enlargement of the superficial lymph nodes, whereas this was not a feature of the Northern Transvaal outbreak. In addition, the last 3 cases of the Rhodesian series had definite pneumonic changes in the lungs.

CASE REPORTS

Early in May 1952 2 boys were admitted to the Roan Antelope Copper Mines Hospital at Luanshya with rigors, fever and vomiting. Both boys had been camping near Bancroft, on the Kafue River, for a week or more and remembered being badly bitten by mosquitoes. Malaria was excluded by repeated blood smears.

Case 1 (aged 16 years). This patient was admitted on 9 May 1959, having had rigors, fever, vomiting and diarrhoea for 5 days. The fever subsided temporarily, but a pink macular rash appeared on the chest, abdomen and arms on 11 May,

when the superficial lymph nodes in the posterior cervical, axillary, and inguinal regions became enlarged. The conjunctivae were injected. Further enlargement of these lymph nodes occurred on 13 May, and the spleen became palpable. Fever persisted until 18 May. When he was seen on 30 May the lymph nodes were unchanged, the spleen was no longer palpable and the patient stated that since leaving hospital he had had pain in the right knee and both ankles for several days.

Case 2 (aged 15 years) was admitted on 15 May 1959, having had rigors, bouts of sweating, fever, and vomiting for 2 days. On 19 May a profuse macular rash appeared on the trunk, and generalized lymph node enlargement was noted. The conjunctivae were deeply injected. The spleen was not enlarged. The next day the lymph nodes in the axillae and groins were enlarged to the size of marbles. When seen on 30 May the conjunctivae were still injected, and the lymph-node enlargement was unchanged. There had been pain in the ankles for several days.

Total white-cell counts in the first 2 cases were normal, with 7-8% and 10-17% monocytes respectively. Paul-Bunnell tests were negative in each case.

Two adults were admitted to the male ward of this hospital a few days after cases 1 and 2. The first had been at Bancroft 8 days before, and had been fishing elsewhere on the Kafue River frequently before and after that time. The other patient had been out fishing on the Kafue River both 8 days and 3 days before admission.

Case 3 (aged 39 years) was admitted on 22 May 1959, having had rigors, fever, pain and swelling of the right elbow, wrists, ankles and right knee, with stiffness of the right shoulder. Next day the superficial lymph nodes were enlarged above the left humeral epicondyle; also in the neck, axillae, and groins; and a sore tongue and throat developed. The convalescence was prolonged with weakness, lassitude, and stiffness in the right shoulder for 2 months. The white-cell count was within normal limits, with monocytes up to 11%, and the erythrocyte sedimentation rate was normal (Wintrobe 14 mm. and Westergren 12 mm. in the first hour).

Case 4 (aged 26 years) was admitted on 25 May 1959, having had high fever and pain in the back and legs for 1 day. During the next 2 days the conjunctivae became injected, and the superficial lymph nodes in the posterior cervical, axillary, and inguinal regions became enlarged. A faint pink erythematous rash appeared on the face and trunk, and there was soreness of the lips, tongue, and hard palate. The white-cell count was within normal limits. The lymphatic enlargement was unchanged when seen on 10 June. Muscular pain persisted for 3 months.

Case 5. I was now called to see a very important visitor to the Territory who, while staying in Luanshya, had become ill with slight pyrexia, adenitis and a slight erythematous flush. He said he had been 'eaten alive' by mosquitoes when fishing on the Luapula River 10 days before. He returned to Salisbury where a diagnosis of glandular fever was made by his physician.

On 3 and 4 June 1959 5 more cases occurred — none of these patients had been away from Luanshya, but 3 of them, R.K. a man of 37, M.K. his son aged 6 years, and A.J. a boy aged 6 years, lived in adjoining houses in a section of the residential area which had suffered a most unusual and unseasonable plague of *Culex fatigans* mosquitoes, the breeding places of which were found to be drums of liquid manure in various gardens in that neighbourhood.

The fourth patient, M.R., a girl of 12 years (the only female in the series) had been to an outdoor party, in the evening, in the garden of a house directly behind the 2 mentioned above, on the night of 22 May.

Three of the 4 patients complained of sore throat, 3 had a macular rash, 2 had pains in the joints at the time of onset, and all had generalized adenitis.

Case 10 (aged 43 years) was the last of the group of patients admitted on 3 and 4 June, and presented with swelling of the wrist- and ankle-joints and the smaller joints of the feet and hands. Two days later the superficial lymph nodes became enlarged. The white-cell count and the erythrocyte sedimentation rate were normal (18 mm. Wintrobe and 8 mm. Westergren). Pain in certain joints, the wrists especially, persisted for more than 3 months.

The last 3 cases in the group (11 - 13) differed in that they all developed pneumonic complications. They presented signs and symptoms similar to those recorded in the other cases, however, and I consider that they might have been affected by the same virus.

Case 11 (aged 5 years) was admitted on 11 June 1959. He looked severely ill, had rigors, fever and delirium at night and showed increasing abdominal distension and tenderness, with enlargement of the cervical lymph nodes only. Four days after admission radiological evidence of pneumonia was found although there were no physical signs in the chest. He had been given 'achromycin' the previous day, but this had had no effect on the pyrexia, and a course of chloramphenicol in full dosage was started on 20 June. The temperature fell to normal on the day the treatment started, but rose 3 days later and persisted until 5 July. The child remained weak and ate poorly for a further fortnight.

Case 12 (aged 38 years) was the father of the last case, and his illness started with a rigor and fever on 14 June 1959; next day the cervical, axillary, and inguinal lymph nodes were enlarged and a faint macular rash was present. The conjunctivae became injected. Fever had subsided by the third day, but on the fourth day of the illness the temperature rose again; backache, vomiting, deeply-injected conjunctivae and flushed skin developed, and later in the day a loud friction-rub was heard in the left axilla. X-rays showed a broad opaque band in the left lung, and the loud friction-rub persisted for a week. Lassitude and weakness prevented him from returning to work for 2 months in all. The Widal and Weil-Felix reactions were negative.

Case 13 (aged 20 months). The final patient in the series, a child of 20 months, had been regarded as suffering from measles on 24 June but, when admitted 9 days later, still had a heavy macular rash all over the trunk, enlarged superficial lymph nodes in the neck, armpits, and groin, and a pleuritic-friction rub and consolidation in the left lung, with a distended and tender abdomen. The illness responded slowly to a week's course of chloramphenicol and the patient recovered in 2 - 3 weeks.

FURTHER LABORATORY INVESTIGATIONS

Since the disease resembled both glandular fever and dengue fever in some respects, and a virus pneumonia was associated with several of the cases as well, I decided to ask Dr. James Gear, of the South African Institute for Medical Research, Johannesburg, whether he would be willing to investigate the condition in an attempt to indentify a virus as the causative agent. He kindly agreed to do this, and several blood and faecal specimens were sent to Johannesburg from convalescent cases. No virus was isolated, but the serum of one patient, V.R. (case 1), when tested against Semliki Forest and Chikungunya antigens, showed inhibition of the Semliki Forest antigen in a dilution of 1:40 and of Chikungunya antigen in a dilution of 1:640, no end-point being reached with this antigen. Complement fixation tests against these 2 antigens were also carried out. There was no fixation against Semliki Forest antigen, but complement was fixed to a dilution of 1:32 against Chikungunya. Later the serum

TABLE I. SIGNS AND SYMPTOMS OF 13 PATIENTS IN THE NORTHERN RHODESIAN OUTBREAK

Case	*Initials*	*Age in years*	*Adenitis at onset*	*Arthritis at onset*	*Arthritis in convalescence*	*Sore throat*	*Sore tongue*	*Rash*	*Severe muscular pain*	*Conjunctivitis*	*Splenic enlargement*	*Pneumonia*	*Prolonged convalescence*
1	V.R.	16	+		+			++		+	+		
2	G.v.B.	15	++		+			++		+			
3	W.A.J.	39	+	++		+	+						+
4	R.H.	26	+			+	+	+	+	+			
6	R.K.	37	+	+				+		+			
7	M.K.	6	+	+		+							
8	A.J.	6	+			+		++		+			
9	M.R.	12	+			+		++		+			
10	D.A.O.	43	+	++									
11	J.D.	5	+									+	+
12	R.J.D.	39	+					+	+	+		+	+
13	N.J.	1½	+					++				+	
Total no. of patients showing each sign and symptom			12	4	2	5	2	8	2	7	1	3	3

+ = present to a moderate degree; ++ = present to a severe degree. Case 5 is not included in the above table.

of G.v.B. (case 2) was reported by Dr. R. H. Kokernot, of the Rockefeller Foundation, Johannesburg, to inhibit the agglutination of Chikungunya antigen in a dilution of 1:640 or greater, while Semliki Forest and Uganda antigens were inhibited in dilutions of 1:40.

In view of these findings Dr. Gear wrote that it would be worth while to test sera from patients who had recovered. Accordingly sera from 7 more patients were sent for testing and in 3 of these cases (3, 6 and 7) the Chikungunya antigen was inhibited in a dilution of 1:320.

DISCUSSION

There seem reasonable grounds for the assumption that most of these cases represent one clinical entity, and their general resemblance to the cases of Gear and Reid[1] is striking.

They showed the same sharp pyrexial bout of sudden onset and fairly short duration, while some had sore throat, an erythematous rash (which was usually macular), injection of the conjunctivae, muscular pains and involvement of several joints (Table I).

A particularly noticeable point of resemblance was the manner in which the joint pains tended to persist in spite of normal erythrocyte sedimentation rates, and the prolonged period of convalescence. On the other hand, it is certainly surprising that only in one instance was lymph gland enlargement noted in the Transvaal cases, while it was a constant and prominent feature in our series. However, I think the serological findings, incomplete and inconclusive though they undoubtedly are, do suggest that the Chikungunya virus may be implicated in the Luanshya cases.

The question of the disease vector is interesting. I have been informed by Dr. Gear in a private communication that he considers the vector in his series was probably a mosquito, though this could not be proved.

I have already stated that the sudden appearance of very large numbers of *Culex fatigans* mosquitoes in Luanshya in May and early June was quite exceptional; it caused numerous bitter complaints from residents in a small locality in Luanshya where 5 cases probably originated, and it is reasonable to assume that a number of the earlier group of cases had also been bitten by this mosquito. Although it is obviously impossible to draw definite conclusions, *Culex fatigans* must, for the time being, be regarded as a definite suspect when an attempt is made to track down the propagator of this disease.

SUMMARY

A series of 13 cases of Chikungunya fever occurring in Luanshya, Northern Rhodesia, during May and June 1959, is reported. Three of the cases had signs of pneumonia. Laboratory investigations, which helped to identify a virus as the causal agent, are described. The similarity between the cases reported and those which occurred in an earlier outbreak in the Transvaal, are noted. The vector of the disease is suspected to be the mosquito *Culex fatigans*.

I am greatly indebted to Dr. James Gear, Director of the South African Institute for Medical Research, Johannesburg, for his assistance and advice. I also wish to thank Dr. R. H. Kokernot of the Rockefeller Foundation, Johannesburg, for his kindness in undertaking the investigation of these cases.

REFERENCE

1. Gear, J. H. S. and Reid, F. P. (1957): S. Afr. Med. J., 31, 253.